



## IDEM's Surface Water Quality Assessment Program

### Fish Community Sampling Program

#### Program Objective

The objective of the fish community sampling program is to assess water quality using resident fish assemblage data as a tool to monitor the biological integrity of a stream. There are many advantages of using fish for monitoring biological integrity of streams: a life span of greater than three years allows detection of degradation that has occurred over an extended period of time, extensive life history, feeding and reproductive behavior of many species are well known, the identification of many species can be made in the field without extensive laboratory processing, and the public is more familiar and knowledgeable with fish.

Indiana narrative biological criteria [327 IAC 2-1-3(2)] states that "all waters, except those designated as limited use, will be capable of supporting a well-balanced, warm water aquatic community." The water quality standard definition of a "well-balanced aquatic community" is "an aquatic community which is diverse in species composition, contains several different trophic levels, and is not composed mainly of strictly pollution tolerant species" [327 IAC 2-1-9(49)]. A stream segment is non-supporting for Aquatic Life Use (ALUS) when the monitored fish community receives an Index of Biotic Integrity (IBI) score of less than 35 which is considered "Poor" or "Very Poor."

#### Program Participants

This program is operated through the Biological Studies Section in IDEM's Office of Water Quality Assessment Branch with the aid of the Indiana Biological Survey Aquatic Research Center.

#### Program Description

Media:	Surface Water: Rivers and Streams
Study Area:	Statewide (in targeted basins based on a five year rotating basin cycle excluding the mainstem Ohio River and Lake Michigan)
Site Selection Type:	Fish community assemblage data will be collected at sites if water is present in at least 50% of the stream reach (reach is defined as 15 times the average wetted width of the stream, minimum 50 meters, maximum 500 meters).
Sampling Sites:	For the Probabilistic Monitoring Program, a minimum of 38 stratified (according to Strahler Order) random sites will be sampled in each of the major river basins (1-2 basins/year). For the Biological Assemblage Stressor ID Program, 30-80 sites (depending on watershed complexity) will be sampled at targeted bridge crossings.
Sampling Frequency:	Sites will be sampled once between June and October.
Data Collected:	Fish community assemblage data for the Index of Biotic Integrity (IBI), Qualitative Habitat Evaluation Index (QHEI), in-situ water chemistry, and other parameters determined necessary (land use, etc.).

#### Technical Notes

The IBI is used to calculate the results of fish assemblage data. The IBI is composed of 12 metrics that assess the community's species and trophic composition (feeding and reproductive guilds) and fish condition and health. The total IBI score, integrity class and attributes help define fish community characteristics. The chart below, modified from a table developed by Karr et al. 1986, uses total IBI score, integrity class and attributes to define the fish community characteristics in Indiana streams and rivers.

<b>Total IBI Score</b>	<b>Integrity Class</b>	<b>Attributes</b>
58-60	Excellent	Comparable to "least impacted" conditions, exceptional assemblage of species.
48-52	Good	Decreased species richness (intolerant species in particular), sensitive species present.
40-44	Fair	Intolerant and sensitive species absent, skewed trophic structure.
28-34	Poor	Top carnivores and many expected species absent or rare, omnivores and tolerant species dominant.
12-22	Very Poor	Few species and individuals present, tolerant species dominant, diseased fish frequent.
<12	No Fish	No fish captured during sampling.

## Program Products

- < Identify those waterbodies not meeting aquatic life use through the Probabilistic Monitoring Program and recommend them for further study using the Biological Assemblage Stressor ID Program.
- < After a water body has been recommended for study, the Biological Assemblage Stressor Program (See Fact Sheet) uses fish community sampling and its stressor ID model (Morris et al. 2006) to accurately depict the extent of the biologically impaired condition in the identified watershed as well as provide information gathered from the results of the study to make recommendations for the watershed studied.
- < Provide information for the Indiana Integrated Water Quality Monitoring and Assessment Report (Section 305(b) and 303(d), list of impaired waters) and support the Environmental Performance Partnership Agreement (EnPPA).
- < Aid in the development of biological criteria, reports on fish assemblage trends and assessments, cooperation and corroboration with program participants on issues of scientific importance.

## References Cited

Karr, J.R., K.D. Fausch, P.L. Angermeier, P.R. Yant, and I.J. Schlosser. 1986. Assessing biological integrity in running waters: a method and its rationale. Ill. Nat. Hist. Surv. Sp. Publ. 5. 28 p.

Morris, C.C., Simon, T.P., and Newhouse, S.A. 2006. A Local-Scale *in situ* Approach for Stressor Identification for Biologically Impaired Aquatic Systems. *Archives of Environmental Contamination and Toxicology* (OnlineFirst).

## Contact Information

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